2.   A molecule comprising a peptide which mimics the binding specificity of an antibody, which peptide is identified by a method comprising:

(a)   screening a first random peptide library with an antibody or antigen-binding derivative thereof that specifically binds to an antigen of interest, to identify a first peptide that specifically binds to said antibody or antigen-binding derivative thereof; and

(b)   screening a second random peptide library which is the same or different from said first random peptide library with a compound comprising said first peptide identified in step (a) or a specific binding portion thereof, to identify a second peptide which binds to said compound and which mimics the binding specificity of said antibody.

3.   The molecule of claim 2, in which said first random peptide library is a different library from said second random peptide library.

4.   The molecule of claim 2, in which said first random peptide library is the same library as said second random peptide library.

6.   A molecule comprising a peptide which mimics the binding specificity of an antibody, which peptide is identified by a method comprising:

(a)   screening a first random peptide library with an antibody or antigen-binding derivative thereof, to identify a plurality of different first peptides each of which specifically binds to said antibody or antigen-binding derivative thereof;

(b)   comparing the sequences of said plurality of different first peptides identified as binding said antibody or antigen-binding

derivative thereof in step (a), to identify a consensus binding sequence; and

(c)   screening a second random peptide library which is the same or different from said first random peptide library with a compound comprising said consensus binding sequence, to identify a second peptide which binds to said compound and which mimics the binding specificity of said antibody.

8.   The molecule of claim 2 in which the antibody is the monoclonal antibody 7E11-C5 which is a murine IgG1 monoclonal antibody which binds specifically to human prostate carcinoma cell line LNCaP, as produced by the hybridoma deposited with the ATCC and assigned accession number HB 10494.

10.   The molecule of claim 2 in which the library of step (a) or step (b) is a library of recombinant vectors that express a plurality of heterofunctional fusion proteins comprising random peptides, said fusion proteins comprising a binding domain encoded by an oligonucleotide comprising unpredictable nucleotides in which the unpredictable nucleotides are arranged in one or more contiguous sequences, wherein the total number of unpredictable nucleotides is greater than or equal to about 15 and less than or equal to about 600, and an effector domain that enhances expression or detection of the binding domain.

15.   A method of identifying a peptide which mimics the binding specificity of an antibody, which method comprises:

(a)   screening a first random peptide library with an antibody or antigen-binding derivative thereof that specifically binds to an antigen of interest, and thereby identifying a first peptide that specifically binds to said antibody or antigen-binding derivative thereof; and

(b)   screening a second random peptide library which is the same or different from said first random peptide library with a compound comprising said first peptide identified in step (a) or a specific binding portion thereof, and thereby identifying a

second peptide which binds to said compound and which mimics the binding specificity of said antibody.

16.   The method of claim 15, in which said first random peptide library is a different library from said second random peptide library.

17.   The method of claim 15, in which said first random peptide library is the same library as said second random peptide library.

19.   The method of claim 15 in which the antibody is the monoclonal antibody 7E11-C5 which is a murine IgG1 monoclonal antibody which binds specifically to human prostate carcinoma cell line LNCaP, as produced by the hybridoma deposited with the ATCC and assigned accession number HB 10494.

21.   The method of claim 15 in which the library of step (a) or step (b) is a library of recombinant vectors that express a plurality of heterofunctional fusion proteins, said fusion proteins each comprising (a) a random peptide comprising a binding domain encoded by an oligonucleotide comprising unpredictable nucleotides in which the unpredictable nucleotides are arranged in one or more contiguous sequences, wherein the total number of unpredictable nucleotides is greater than or equal to about 15 and less than or equal to about 600, and (b) an effector domain that enhances expression or detection of the binding domain.

23.   A method of detecting or measuring an analyte of interest in a sample, comprising:

    (a)   contacting a sample with a molecule comprising a peptide capable of specifically binding said analyte of interest under conditions such that specific binding between said molecule and said analyte can occur; and

    (b)   detecting or measuring the amount of said binding in which the presence and amount of said binding indicates the presence and amount, respectively, of said analyte in the sample;

in which said peptide is identified by the method of claim 15.

24. The method of claim 23 in which said molecule is immobilized on a solid substratum.

27. A composition comprising the molecule of claim 2; and a carrier.

30. A composition comprising the molecule of claim 8; and a pharmaceutically acceptable carrier.

33. A molecule comprising a peptide or a binding portion thereof which mimics the binding specificity of a receptor molecule, which peptide is identified by a method comprising: screening a random peptide library with a ligand of interest, said ligand of interest being a peptide having a length of between 5 and 40 amino acids, to identify a peptide that specifically binds to the ligand of interest, in which the ligand of interest is also specifically bound by an antibody.

35. A method of obtaining an image of an internal region of a subject, wherein said internal image is of a tumor, comprising administering to said subject an effective amount of the molecule of claim 2, wherein said molecule specifically targets said tumor, in which said molecule is radiolabeled with a radioactive metal, and recording the scintigraphic image obtained from the decay of said radioactive metal.

36. A molecule comprising a peptide which mimics the binding specificity of an antibody, which peptide is identified by a method comprising: screening a random peptide library with a ligand, said ligand being a peptide of 36 amino acids or fewer, in which the ligand is an epitope of an antigen that is specifically bound by said antibody or in which the ligand represents the portion of a receptor-ligand that is responsible for the specific binding of the receptor to the receptor-ligand.

40. The molecule which binds to a ligand of interest of claim 33 in which said ligand comprises VTSAPDTRPAPGSTAPPAHGVTSAPDTR (SEQ ID NO: 9) or a portion thereof.

43.   A molecule that binds to polymorphic epithelial mucin, comprising an amino acid sequence represented by the formula:

$R_1R_2R_3R_4R_5R_6R_7R_8R_9R_9R_{10}R_{11}R_{12}R_{13}R_{14}R_{15}R_{16}R_{17}R_{18}R_{19}R_{20}R_{21}R_{22}R_{23}R_{24}R_{25}R_{26}R_{27}R_{28}R_{29}R_{30}R_{31}R_{32}R_{33}R_{34}R_{35}R_{36}R_{37}R_{38}R_{39}R_{40}R_{41}R_{42}R_{43}$ (SEQ ID NO: 88)

wherein:

R_1 = G, C, E, or V;

R_2 = A, S, P, or L;

R_3 = P, T, H, or L;

R_4 = L, M, Q, G, A, or S;

R_5 = W or Y;

R_6 = S, C, K or T;

R_7 = E, S, C, D, V, or R;

R_8 = N, H, K, S, or E;

R_9 = L, H, R, N, Q, T, or G;

R_{10} = W, P, R, T, or D;

R_{11} = W, C, V, L, or G;

R_{12} = S, T, M, or H;

R_{13} = G;

R_{14} = S, A, G, N, Q, or H;

R_{15} = W, H, G, A, or R;

R_{16} = G, T, E, P, V, or W;

R_{17} = V, F, W, K, or A;

R_{18} = K, Q, D, E, R, or L;

R_{19} = R, F, or S;

R_{20} = P, S, I or H;

R_{21} = G;

R_{22} = C;

R_{23} = G;

R_{24} = D, S, T, N;

R_{25} = G, D, L;

R_{26} = P or S;

R_{27} = M, S, D, I, L, or R;

R_{28}= G, W, C, L, F, Y, or T;

R_{29}= S, N, V, F, H, or R;

R_{30}= N, A, S, M, or R;

R_{31}= F, Q, P, or V;

R_{32}= S, V, I, K, A, or S;

R_{33}= P, A, N, or Y;

R_{34}= G, N, or L;

R_{35}= K, R, C, Q or L;

R_{36}= V, K, R, or A;

R_{37}= G, D, A, or E;

R_{38}= S, T, P, Y or W;

R_{39}= R, I, L, P, A or S;

R_{40}= N, K, or M;

R_{41}= S, R, T, E, Q, P, Y or H;

R_{42}= G, A, S, D, N, P, Y, or K;

R_{43}= P, H or A.

44.   The molecule of claim 43 wherein:

R_1= G;

R_2= A;

R_3= P;

R_5= W;

R_6= S;

R_{10}= W;

R_{11}= W;

R_{12}= S or T;

R_{14}= S;

R_{16}= G;

R_{18}= K;

R_{19}= R;

R_{20}= P;

R_{26}= P;

R_{28}= G or W;

R_{30}= N;

R_{31}= F;

R_{33}= P;

R_{35}= K or R;

R_{37}= G;

R_{38}= S;

R_{40}= N or K;

R_{42}= G;

45.   The molecule of claim 2 in which the antibody or antigen-binding derivative thereof is capable of specifically binding to a human tumor antigen.

46.   A method for identifying a peptide which mimics the binding specificity of an antibody, which method comprises: screening a second random peptide library with a compound comprising a first peptide identified by screening a first random peptide library with an antibody or antigen-binding derivative thereof that specifically binds to an antigen of interest, thereby identifying a second peptide which binds to said compound and which mimics the binding specificity of said antibody.